

ABSTRACT

A convenient and efficient method for heating or cooling the mobile phase fluid of a chromatographic system prior to its entry into the chromatographic column is described. The "preheating" or "precooling" process is carried out using an apparatus containing a short length of tubing where the mobile phase is heated or cooled. The heating or cooling is performed using a heating or cooling element that is in intimate thermal contact with the exterior of the tubing. The temperature change of the mobile phase is measured downstream by a non-invasive, low-mass sensing element on the exterior of the tubing. With a low mass heating or cooling element, the device can be very responsive and allows for rapid equilibration and convenient temperature programming of the mobile phase. This configuration also requires only a short mobile phase contact time, is non-invasive, adds no dead volume, and allows for use of columns over a wide range of internal diameter, flow rates and temperatures.